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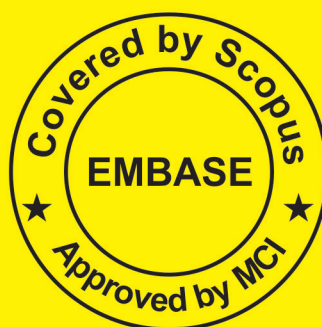
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# Analysis of Relation between Life Style, Workload, and Work Stress with Metabolic Syndrome

Mufatihatul Aziza Nisa<sup>1</sup>, Tri Martiana<sup>2</sup>, Yustinus Denny Ardyanto Wahyudiono<sup>2</sup>

<sup>1</sup>Student in Magister of Occupational Health and Safety, Faculty of Public Health,

<sup>2</sup>Lecturer in Departement of Occupational Health and Safety, Faculty of Public Health,  
Airlangga University, Campus C Mulyorejo, Surabaya-Indonesia

## ABSTRACT

Metabolic syndrome is a set of risk factor symptoms of cardiovascular disease and diabetes mellitus. Risk factor symptoms are found on Officers of Tanjung Perak Port Class I Health Office, some of them are urban society lifestyle, heterogenous workload and stress based on the working scope, administrative and field work. This research is aimed to analyze the relation between lifestyle, workload, and work stress with metabolic syndrome and its five indicators (blood pressure levels, pre-prandial blood glucose levels, HDL cholesterol levels, abdominal circumference, and triglycerides levels)

This research is an observational research with cross sectional research design. The number of research respondents is 39 Government Employees. Lifestyle, workload, and work stress are independent variables. The dependent variables are metabolic syndrome and its five indicators.

13.4% of respondents have metabolic syndrome. Analysis of fisher test found there is a significant relation between frequency of fruit consumption and metabolic syndrome ( $p=0,047$ ).

It is suggested to do a regular medical examination program and provide some variation of fruits menu to be served in meetings or office agendas in order to increase the frequency of fruits consumption.

**Keywords:** *Metabolic Syndrome, Employees, Lifestyle, Workload, Work stress.*

## INTRODUCTION

Precursors of non-communicable diseases such as diabetes mellitus and cardiovascular diseases are known as metabolic syndrome<sup>1</sup>. Metabolic syndrome is a set of risk factor symptoms of cardiovascular diseases and diabetes mellitus<sup>2</sup>. The symptoms are abdominal circumference or abdominal obesity, increased blood pressure, increased pre-prandial blood glucose levels, triglycerides levels, decreased HDL cholesterol levels, if three of the five symptoms are met, the employee can be categorized in metabolic syndrome<sup>3</sup>.

Metabolic syndrome prevalence in developing countries, Iran (30%), South Korea (28%), India (25%), Hongkong and Mexico (22%), Vietnam (18.5%), Oman and Palestine (17%), Taiwan (15.1%), and China (13.3%)<sup>4</sup>. Metabolic Syndrome Prevalence based on work types on 120,000 workers in Japan was found that construction workers, and health officers have the highest prevalence<sup>5</sup>.

Specifically, there is no information found about metabolic syndrome prevalence in Indonesia as developing country, on the workers or based on the work statuses. But, based on *Riset Kesehatan Dasar* (Basic Health Research) on 2013, the number of coronary artery disease prevalence as one of the outcomes of metabolic syndrome in Indonesia (2013) found in the working age group 15-55 years old, diagnosed by doctors is 1.3% and symptoms is 5%<sup>6</sup>. Furthermore, according to Basic

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**Corresponding author:**

**Prof. Dr. Tri Martiana**

Lecturer in Departement of Occupational Health and Safety, Faculty of Public Health, Airlangga University  
Campus C Mulyorejo 60115, Surabaya-Indonesia

Health Research Data in 2007, obesity prevalence on people aged <15 years old is 13,9% on male, and 23,8% on female<sup>7</sup>. Prevalence levels based on work types is higher on employees and entrepreneurs compared to works such as farmers, fishers or labors. Meanwhile, hypertension prevalence on people aged >18 in Indonesia is 31,7%<sup>7</sup>. Obesity prevalence is found increased (19,7) on Basic Health Research in 2013, with prevalence based on work types is still higher on employees and entrepreneurs compared to farmers, fishers or labors<sup>6</sup>.

The high number of metabolic syndrome prevalence in some developing countries, including Indonesia, is caused by the changes in the era of industrialization and urbanization so it causes changes in lifestyle on industrial society. Industrial people lifestyle tends to be recognized by the decrease of physical activity, and the increase of energy consumption. The decreased of physical activity, exercise habits, and the increase of energy consumption cause the obesity increase in industrial society, which obesity is one of risk factors of metabolic syndrome<sup>4</sup>. Dominant factor of the obesity other than the lack of physical activities is also the high number of fatty foods consumption<sup>8</sup>.

Based on meta analysis from 13 studies about smoking habits mentioning that active smoking is related with increased risks of metabolic syndrome<sup>9</sup>. Nutrition intake, physical activity, and exercise habits are risk factors that can be modified, so it can be a preventive way or countermeasures of metabolic syndrome risks. Physical activity according to Tarwaka (2005) in working place can be reviewed from working activity through physical work load is also a risk factor that can be modified. Considering that human activity is not only loaded physically, but also mentally, so each of them has different level of loads and effects<sup>10</sup>. Both demands of physical and mental load with their interaction is proven increasing biomechanical load, physiological reactivity, and performance disruption<sup>11</sup>. A strong relation between overall workload, physic and mental, and health problems is rarely studied, so the related studies should be known.

The research is aimed to analyze the relation between risk factors of metabolic syndrome such as life style, workload and work stress with metabolic syndrome on government employees in health office of Tanjung Perak port Surabaya.

It is interesting because metabolic syndrome case is believed that has cause more health care cost from the company, and also decrease the workers life quality during the working period or after the working period ends (retired or stop working)<sup>12</sup>.

## MATERIAL AND METHOD

The research design used is cross sectional with observational research as the type of the research. The number of respondents are 39 people with criteria inclusion, healthy, and voluntarily agree to be the respondents of the research. The research located in the Port Health Office Class I Surabaya conducted in January-June 2017.

The research independent variables are life style (diet (calories intake, types (staple, side dish, vegetables, fruits, and snacks), and frequency), consumption levels (carbohydrates, proteins, and fats), smoking habits (smoking status, number of cigarette consumption, duration of smoking), drinking habits, and exercise habits, workload (physical and mental workload), and work stress. The dependent variables are metabolic syndrome, and its five indicators (blood pressure, pre-prandial blood glucose levels, HDL cholesterol levels, abdominal circumference, and triglycerides levels).

The data collection technique was valid questionnaires about smoking habits, drinking habits, exercise habits, mental workload, and work stress. Questionnaire about mental workload used NASA TLX questionnaire, and working stress questionnaire used questionnaire from HSE. Respondents' diet was measured using food frequency and food record for 3 days. The measurement of abdominal circumference (abdominal obesity) used measuring tape, physical workload is measured by Calorimeter Heart Rate Watch, Brand: Ultimate Gear. The examination of pre-prandial blood glucose levels, triglycerides, and HDL cholesterol is done by blood laboratory examination. Blood pressure measurement used tensimeter Hg, Brand: OneMed. Methods of analysis used are descriptive analysis and bivariate analysis.

## FINDING

### Individual Characteristics

The youngest respondent of the research is 27 years old, and the oldest respondent is 57 years old.

The number of female respondents (51.3%) is slightly bigger than the male respondents (48.7%). There is less research respondents who have hereditary diabetes mellitus (48.7%) than who have hereditary hypertension (59%) in their family.

### Life Style

In a day, the average number of energy of the research respondents is 1563.21 KiloCalories, and could be categorized as a lack of calorie consumption. Most of the respondents consume complete types of food (staple, side dish, vegetables, fruits, and snacks). The highest frequency of eating for staple (94.9%), side dish (69.2%), vegetables (56.4%) and fruits (51.3%) is/ more than 3 times a day, and for the snacks, the highest frequency is 1-3 times a week.

Level of consumption of Carbohydrates (94.9%), Protein (59%), and Fats (82.1%) of research respondents is mostly on very low level of consumption. 20.5% of respondents is active smokers, 84.6% of respondents are light smoker, 12.8% are moderate smokers, and 2.6% of the them are heavy smokers. The longest duration of smoking is 29 years, and the shortest duration is 12 years, counted since the first time until the research was held.

Enough exercise habits (>3 times a week with 30 minutes duration) is only done by small number of respondents, 5 respondents (12.8%), compared to lack of exercise habits (<3 times a week with 30 minutes duration) that is done by 34 respondents (87.2%). Meanwhile, drinking habits is constantly answered in never category by the respondents.

### Workload

Descriptively, physical workload in this research is categorized as light (61.5%). Based on the mental workload score category distribution, the highest score is the respondents' percentages who have moderate and heavy mental workload category (91.4%).

### Work Stress

Working stress of respondents is mostly found on moderate category (75.4%).

### Metabolic Syndrome and Its Components

The research finding about metabolic syndrome on obese male employees by Fitria Nurjanah and Katrin

Rosita (2015) shows that metabolic syndrome indicators dominantly found are abdominal obesity (96.5%), followed by hypertriglyceridemia (82.76%) and low HDL cholesterol (72.41%)<sup>13</sup>.

Metabolic syndrome percentage (12.8%) in this research is still lower than world metabolic syndrome prevalence (20-25%)<sup>3</sup>. It was enough to be a sign that should be a warning. Compared to the world prevalence, is related to the field work of the respondents which is mostly government employees in administrative works. The finding of metabolic syndrome case on employees who mostly do administrative work should only have a low chance and can be controlled by having a healthy lifestyle. This analysis is based on the result of logistic regression analysis on United States workers which found that, workers in transportation field have more chance to meet the metabolic syndrome criteria than administrative, executive, and managerial workers<sup>14</sup>.

Relation Test Result between Life Style, Workload, and Working Stress, with Metabolic Syndrome

The table 1. show that the variable of metabolic syndrome is significantly related to frequency of fruits consumption. It can be seen from the P-value score of fisher relation test (0.047), is bigger than 0.05. The coefficient correlation of both variables is 0.350, there is a positive correlation with a weak correlation.

Based on the cross table between fruits consumption variable and metabolic syndrome case, the percentage of fruits consumption frequency that has metabolic syndrome on the category 3 times/day/less is 25% bigger from the total of respondents in the category. Compared to the fruits consumption frequency that has metabolic syndrome on the category >3 times/day or 1-3 & > 3 times/week which is 0% of the total of respondents in the category.

In line with Setayeshgar (2014) which also study about food consumption factor with metabolic syndrome on Canadian, found that fruits and vegetables consumption was related with the metabolic syndrome indicator, which is abdominal obesity<sup>15</sup>.

Fruits are full of micronutrients such as vitamin that acts as antioxidants. These antioxidants are Vitamin A, C, and E. Antioxidant is a compound that can neutralize the unstable free radical molecules produced by many normal body chemical process, or by sun's radiation,

cigarrate smokes, and other environmental influences<sup>16</sup>.

In the body, the majority of free radicals are produced by complex chemical process when oxygen is used inside the cells. The free radicals that is chemically incomplete can “steal” particles from other molecules to produces abnormal compounds and makes chain reactions that can damage cells, by making fundamental changes on genetic materials and other important parts of the cells<sup>16</sup>. The free radicals can be suppressed by giving a combination of Vitamin E and Vitamin C. Vitamin C suppress free radicals that is dissolved in water, while

Vitamin E can hamper the chained oxidation reaction of LDL<sup>17</sup>. Vitamin C also can decrease high serum triglycerides level that contributes in the occurrence of cardiac disease<sup>18</sup>.

Park S (2015) found that consumption of Vitamin A and C, and also moderate and high fruits consumption are able to decrease metabolic syndrome case on women from general population in South Korea<sup>19</sup>. It is supported too by Niazi SH (2014) research that among certain fiber sources, fruits fiber has protection effect against MetS risks<sup>20</sup>.

**Table 1. Relation Test Result**

Variables		Metabolic Syndrome		
		p-value	r-value	
Workers Characteristics		Age (year)	0,636	0,126
		Gender	0,661	0,086
		Hereditary Hypertension	1,000	0,008
		Hereditary Diabetes Mellitus	0,661	0,086
Lifestyles	Diet	Total Food Calorie	-	-
		Food Types	0,139	0,276
		Eating frequency Staple	1,000	0.089
		Eating frequency Side dish	1,000	0,089
		Eating frequency Vegetables	1,000	0,028
		Eating frequency Fruits	<b>0,047</b>	<b>0,350</b>
		Eating frequency Snacks	0,125	0,091
	Consumption levels	Consumption level of Protein	1,000	0,020
		Consumption level of Fats	1,000	0,129
		Consumption level of Carbohydrate	1,000	0,089
	Smoking Habits	Smoking Status	1,000	0,005
		Smoking Frequency	1,000	0,049
		Smoking duration	1,000	0,049
	Drinking Habits		-	-
	Exercise Habits		1,000	0,145
Work load		Physical Workload	1,000	0,012
		Mental Workload	0,072	0,352
Work Stress		1,000	0,020	



## CONCLUSION

Most of respondents aged more than 40 years old are 25 people, the food types eaten is mostly complete (staple, side dish, vegetables, fruits, and snacks), the major frequency of the food consumption (staple, side dish, vegetables, fruits and snacks) is or less than 3 times a day, and generally the total calorie consumption is less, the level of protein, fats, and carbohydrates consumption is very low. The majority of the respondents have the risk of hereditary hypertension and diabetes mellitus, most of them are not smoker, and the respondents who smoke are only light smokers with at least 12 years duration of smoking, in general the respondents have less frequent exercise habits, and all the employees do not have ost of the respondents measured are having light workload but some of them feel moderate to heavy mental workload, and majority of them feel moderate working stress.

The lack of fruits consumption can contribute the metabolic syndrome case on government employees.

**Conflict of Interest:** None

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**Ethical Clearance:** The research proposal has been approved by Health Research Ethical Commission of Public Health Faculty Airlangga University, number: 120-KEPK. All respondents were given explanation and information about the purposes and methods of the research, and also had signed informed consent forms.

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